1. Capital Expenses[86]

53. In this section we analyze the relative advantages and disadvantages of each existing model's method for computing capital expenses, which include return on equity, taxes, interest, and depreciation expenses. We first discuss the methodologies used by existing models to compute capital-related expenses. Each of the three models calculates capital costs somewhat differently. BCM2 does not explicitly reveal its cost of capital and depreciation rates. These values are implicit in three annual costs factors that are used to derive annual expenses. In the CPM and Hatfield 2.2.2, capital expenses are computed as the sum of a return on investment, taxes, and depreciation. In Hatfield 2.2.2, the return on investment is equal to the net investment base (gross investment minus accumulated depreciation) multiplied by a rate of return equal to a weighted average of the cost of equity and the cost of debt, with weights equal to the corresponding percentages of equity and debt in total investment. Taxes in Hatfield 2.2.2 are equal to the product of the net investment base, the percentage return on equity, the percentage share of equity and a "tax gross up" factor determined by the following equation:

$$Taxes = \%Equity \times \%Return\ on\ Equity \times Investment\ Base \times \frac{Composite\ Tax\ Rate}{(1 - Composite\ Tax\ Rate)}.$$

54. For each category of plant, the capital cost is computed for each year of the economic life of the plant and the resulting stream of returns is "levelized" through a net present value calculation to give a constant annual cost of capital for that category of investment.[87] Aggregate capital costs are then computed as the sum of the capital costs for each category of plant.

55. The CPM computes capital costs in a manner that is conceptually similar to the Hatfield 2.2.2. The CPM approach, however, includes an adjustment for the difference between book depreciation and tax depreciation in computing its net investment base.[88] These differences in investment base will produce differences in capital expenses between the CPM and Hatfield 2.2.2 even if both models produce the same network investments. The sponsors of the CPM have not, however, furnished any justification for the use of tax depreciation rates in a forward-looking cost study.

56. In addition to methodological issues, a number of additional issues must be

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[86] The authors wish to thank C. Anthony Bush of the Commission's Competition Division for his valuable contributions to this section.

[87] Economic lives are specified for each of thirteen categories of plant.

[88] *Ex Parte*, Letter from Jay Bennett, Director of Regulatory Relations, Pacific Telesis, to William F. Caton, FCC, dated July 12, 1996.

resolved in order to obtain accurate capital cost estimates. In both the CPM and Hatfield 2.2.2, depreciation rates for categories of network investment may be specified by the user of the model. In addition, Hatfield 2.2.2 allows the user to specify the composite tax rate, shares of debt and equity in total investment, and the costs of debt and equity financing. Each of these factors will have a direct impact on the total capital expenses predicted by the model.

57. The forward-looking cost of capital is a weighted average of the forward-looking cost of debt and the forward-looking cost of equity. Hatfield 2.2.2 specifies default values of 7.7 percent for the cost of debt, 11.9 percent for the cost of equity, and a 55 percent proportion of equity financing. These assumptions imply a value of 10 percent for the cost of capital. We believe that, when estimating the forward-looking cost of capital, models should rely on market-determined costs for debt and equity as well as debt-equity ratios chosen by firms.

58. We are in the process of evaluating several alternative approaches to determining the market-based cost of capital that do not require a cost of capital proceeding. For example, USTA, in another proceeding, proposed using the cost of capital implicit in the U.S. National Income and Product Accounts to compute capital cost in a Total Factor Productivity Study.[89] USTA argued that because capital markets are national and because risk levels for telephone assets are similar to those for other assets in the U.S. economy, year-to-year changes in the telephone industry's cost of capital should follow year-to-year changes in the U.S. economy's cost of capital. Alternatively, an implicit rental price for capital could be computed by dividing property income by the real capital stock, where property income is the difference between revenues and expenses on labor and materials. The real capital stock could be constructed by using the Perpetual Inventory Model.[90] Although we recognize that these methods are inherently not forward-looking, we are continuing to investigate whether either approach can be used to obtain an accurate estimate of the forward-looking cost of capital.

59. The second component of a capital expense computation is a model's choice of depreciation rates. As described above, higher levels of depreciation lead to lower levels of investment base, and consequently lower annual expenses associated with return on investment and income taxes. Thus, changes in annual capital costs caused by changes in depreciation rates will automatically be mitigated to some extent by offsetting changes in return and taxes.

60. Hatfield 2.2.2 uses default asset lives that result in a depreciation rate of 6.56 percent for the Regional Bell Operating Companies, which corresponds to an average plant life of approximately fifteen years. The CPM uses a composite depreciation rate of 8.9

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[89] USTA Comments, *Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1, Fourth Further Notice of Proposed Rulemaking, 10 FCC Rcd 13659 (1995).

[90] C.R. Hulten and F.C. Wykoff, "The Measurement of Economic Depreciation," in C.R. Hulten, ed., *Depreciation, Inflation and the Taxation of Income from Capital* (Washington, D.C.: The Urban Institute Press, 1981), p. 101.

percent, corresponding to an average asset life of 11.9 years. The 1995 ARMIS data provide a composite depreciation rate of approximately 7 percent for Regional Bell Operating Companies, corresponding to an average plant life of 14 years. This rate is greater than the Hatfield 2.2.2 depreciation rate, but less than that used in the CPM.

61. We believe that depreciation schedules specified in a proxy model should be based on forward-looking costing principles and should reflect projected economic lives of investments rather than physical plant lives. As discussed above, we believe that the reported plant lives for loop-plant structures, such as conduit, manholes, and poles, are particularly important. Because of the relatively large investment necessary to construct such facilities, inaccurate estimation of the expected economic lives of such facilities may result in a significant under or overestimation of the forward-looking cost of these facilities. We also believe that the depreciation rates reported by incumbent LECs for financial purposes may provide information to determine the appropriate economic lives of facilities. We are continuing to evaluate the use of depreciation rates reported in ARMIS data.

62. We are also aware of alternative measures of depreciation that could be used to estimate forward-looking depreciation rates. For example, USTA has proposed that asset lives computed by the Bureau of Economic Analysis ("BEA") and the Bureau of Labor Statistics could be used to calculate economic depreciation rates for the LECs. Alternatively, depreciation rates derived from the Hulten-Wykoff formulas,[91] which link depreciation rates to expected lifetimes (BEA lifetimes), may be appropriate. Finally, USTA proposed the use of economic depreciation rates from a study by Jorgenson[92] for determining capital costs in a total factor productivity study. We are currently investigating whether the economic depreciation rates published by Jorgenson are appropriate for use in a model. It may be important to determine whether depreciation rates should differ depending on what services carriers expect to provide over an existing facility or the facility that will replace the existing facility. For example, the depreciation rate for copper cable may be affected by a carrier's plan to offer broadband services. Because broadband service may not be a supported service, should the depreciation rate used to determine the level of support for universal service differ from that used to price unbundled elements?

63. As noted above, all of the models estimate a forward-looking level of network investment that is significantly less than total investment levels recorded in ARMIS data. In addition, net investment (gross investment minus accumulated depreciation) reported by ARMIS is significantly greater than a comparable measure of net investment derived from

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[91] Charles R. Hulten, "The Measurement of Capital," in E.R. Berndt and J.E. Triplett, eds., *Fifty Years of Economic Measurement*, (Chicago: University of Chicago Press, 1990), pp. 119-152.

[92] Dale Jorgenson, "Productivity and Economic Growth," in E.R. Berndt and J.E. Triplett, eds., *Fifty Years of Economic Measurement*, (Chicago: University of Chicago Press, 1990), pp. 19-118.

Hatfield 2.2.2.[93] We are unable to conclude at this time whether these differences are a result of insufficient levels of model investment for providing required facilities or services,[94] the model proponents' network design assumptions and choices of inputs, the non-economic depreciation policies utilized in the past, or inefficient overinvestment decisions by incumbent carriers. For example, past depreciation policies may have resulted in under-depreciation of assets because of unanticipated technological change, or because they did not account for changes in input prices that may have reduced the forward-looking cost of provisioning a network.[95] We believe that it may be important to determine the extent to which these and other factors may account for the above noted differences in network investment reported by ARMIS and estimated by the models.[96]

2. Operating Expenses

64. In this section we discuss methods of computing non-capital-related expenses. These account for over one-half of the total annual cost of the network in some models, and include expenses related to both plant-related operating expenses and non-plant-related expenses. As noted above, the variation in the estimates of the total monthly cost of providing network elements, which includes operating and overhead expenses, produced by Hatfield 2.2.2, BCM2, and CPM is significantly greater than estimates of underlying network investments. Based on our analysis of these models to date, we believe that differences in the treatment of operating expenses may account for significant differences among the models and between the models and ARMIS data.

65. Both BCM2 and Hatfield 2.2.2 use annual cost factors to calculate non-capital-related expenses. An annual cost factor is the ratio of expense booked to a specific account and the gross investment booked to the same account. Typically, the expense associated with investment is the product of the model-generated investment and the associated annual cost factor. Annual cost factors are used by models, as well as by companies in individual cost studies, because methods for developing forward-looking expenses are complex and contentious. In the BCM1, a single expense factor, derived from nationally averaged accounting data, was used to convert network investments into monthly costs at the CBG level. In the BCM2, three separate factors are applied to three aggregate categories of plant investment: cable and wire; circuit equipment; and switching equipment. These factors are used to estimate the total level of capital costs, operating expenses, and corporate overheads. In Hatfield 2.2.2, network operations expense, and attributable support expenses are computed

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[93] On a per-line basis, average net investment for all RBOCs is equal to $900 in ARMIS data and $458 in Hatfield 2.2.2. We are unable at this time to compute a value of net investment for either the BCM2 or the CPM.

[94] *See supra* note 23.

[95] *See Access Reform NPRM,* FCC No. 96-488, CC Docket No. 96-262, at paras. 250-254.

[96] *Id.*

for each plant account. Operating expenses are based on historical expense factors calculated from balance sheet and expense account information in carriers' ARMIS reports on a state-by-state basis.[97] Network-related expenses, which vary with capital investment or number of lines, are allocated accordingly. Non-network operating expenses are allocated based on data from comparable support expenses in competitive industries.

66. An alternative to the annual cost factor approach is used by the CPM, which employs an activity-based costing approach that uses accounting methods to trace expenses at a highly disaggregated level. The CPM uses Pacific Bell's 1994 per-line maintenance and repair expenses, adding a fixed amount per loop. Some adjustments are made to reflect a forward-looking methodology. For example, maintenance expenses for analog switches are excluded. While this approach is potentially able to provide an accurate accounting of expenses at any point in time, there may be two potential problems with it. First, the underlying data required may be proprietary and specific to each operating company, and thus, verification of model results may be difficult. Second, the methodology uses historical data rather than forward-looking data.

67. We are currently in the process of evaluating specific alternatives to the use of annual charge factors or accounting-based methods. For example, a different annual charge factor could be computed by taking the ratio of current expenses to a measure of current investment, which could be computed by revaluing embedded investment at current input prices using telephone plant price indices.[98] We are evaluating the feasibility of this approach, and the consequences of using it in the determination of forward-looking operating expenses. We also recognize that quality of service practices and guarantees differ by type of customer. Typically, lines used by interexchange carriers and multi-line business customers are repaired faster than residential customer lines. If adequate data were available, these practices could potentially justify specific maintenance factors.

68. A different approach to estimating expenses might be to make use of yardstick comparisons in which, for each category of expenses, explicit comparisons would be made of current year expenses (or an average of expenses over the past three years) among all companies of a given size or type. Assuming that the methods of accounting for expenses across companies were consistent with each other, the forward-looking cost for each expense category would then correspond to the lowest observed cost.

69. Another approach, based on econometric methods, might be to specify non-

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[97] However, for switch repair and maintenance costs, the model uses data from New England Telephone, which was judged to be an efficient provider of these services.

[98] Southwestern Bell Telephone Company performed such a calculation in evaluating the Hatfield model. It adjusted ARMIS data by restating embedded investments on a current cost basis. *See Ex parte*, Letter from Todd F. Silbergeld, Director-Federal Regulatory, SBC Communications Inc., to James D. Schlichting, Chief, Common Carrier Bureau, Competitive Pricing Division, October 29, 1996, p. 4.

capital-related expenses as a function of the amount of investment and the volumes of output. Historical data would then be used to estimate the parameters of the assumed functional form. This approach could be used to estimate expenses given levels of investment from an engineering study. We note, however, that any econometric approach is based on a relationship among historical variables, and we believe that such approaches must be cautiously interpreted in estimating forward-looking expenses. An econometric approach could also be used to estimate the total cost of network elements, as a function of loops, DEMs, and trunking facilities. Given appropriate treatment of the price of capital (based on the risk-adjusted cost of capital and economic depreciation rates) such an econometric cost function could represent the forward-looking cost of network elements.

3. Treatment of Joint and Common Costs

70. If proxy models are used to estimate forward-looking economic costs, the question of joint and common costs must be addressed. In the case of pricing of unbundled network elements, costs that are common to a set of network elements can be allocated among the individual elements in that set. For example, shared maintenance facilities could be allocated to the elements that benefit from those facilities. Common costs also include costs incurred by the firm's operations as a whole. Given these joint and common costs, setting prices for individual network elements based on forward-looking incremental costs alone would not recover the full forward-looking cost of the network. In the *Local Competition Order*, the Commission concluded that recovery of forward-looking joint and common costs is appropriate under a forward-looking economic cost paradigm, and that a reasonable measure of such costs should be included in the prices for interconnection and unbundled network elements.[99]

71. If proxy models are used in determining universal service support payments or in setting cost-based access charges, additional issues are raised in the treatment of joint and common costs. Each of the proxy models addresses these issues differently. BCM2 assumes common costs are equal to 75 percent of the ARMIS per-line common costs. Hatfield 2.2.2 assumes that corporate overhead expenses vary with the size of the firm, and the model attributes a fixed proportion of aggregate total cost, set by default at 10 percent, to overhead expenses. The CPM assigns a fixed amount of joint and common costs to universal service based on Pacific Telesis accounting data. Current versions of the CPM also allow for a variable overhead allocation similar to the Hatfield 2.2.2 approach.

72. Based on our review, we believe that proxy models do not currently offer adequate justification for their calculation of forward-looking joint and common costs. Additional evidence is needed to justify their treatment of these costs. We are also examining alternative methods outside of the models, including econometric approaches, that might be used to establish an appropriate level of forward-looking joint and common costs.

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[99] *Local Competition Order*, para. 682.

D. Summary

73. As explained in detail above, acceptable cost proxy models should estimate accurately the forward-looking cost of operating a telecommunications network providing unbundled network elements, supported services, or access services. While treatment of all modeling variables is important, our current understanding of the models leads us to highlight a number of areas in which we believe that additional modelling effort or supporting studies may be warranted. The core of a proxy model consists of the algorithms that it uses to determine total network investment. We are particularly interested in evaluating a model's ability to estimate total loop investment. For example, we believe that additional justification of a model's choice of fill factors and treatment of structure costs would be desirable. On the expense side, we believe further study is required to determine the appropriate forward looking cost of capital and rates of depreciation. We also believe that model proponents should further refine the methodologies that current models use to estimate forward-looking operating expenses. Since these expenses may comprise, in some models, over one-half of the total costs of network elements or supported services, we believe that additional supporting studies of non-capital expenses by model sponsors and outside parties would be desirable.

V. CONCLUSION

74. By releasing this paper, we seek to stimulate discussion that will assist state and federal regulators in evaluating, and industry participants in designing, cost proxy models for possible use in pending Commission proceedings. We look forward to working with all interested parties in developing reasonable approaches to using economic cost models on these critical telecommunications policy issues.

PUBLIC NOTICE

Federal Communications Commission
1919 M St., N.W.
Washington, D.C. 20554

DA 97-56
Released January 9, 1997

COMMISSION STAFF RELEASES ANALYSIS OF FORWARD-LOOKING ECONOMIC COST PROXY MODELS

Comment Date: February 3, 1997
Reply Comment Date: February 14, 1997

This past year, the Commission has undertaken proceedings on universal service, interstate access charge reform, and local exchange competition to overhaul our current regulations in light of the Telecommunications Act of 1996. In each proceeding the Commission has examined the use of cost proxy models as a regulatory tool to estimate forward-looking economic costs of providing telephone service. Today the Commission Staff released a staff analysis intended to stimulate discussion of criteria for the evaluation, and use, of forward-looking cost proxy models in determining universal service support payments, cost-based access charges, and interconnection and unbundled network element pricing. The Common Carrier Bureau ("Bureau") here is seeking comment on the issues raised in the paper. The record gathered in response to this paper may at a future date be associated with the official record of certain pending rulemakings to which it may be relevant and may be used to support Commission determinations in those rulemakings. These rulemakings are *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, *Access Charge Reform*, CC Docket No. 96-262, and *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996,* CC Docket No. 96-98.

The staff's analysis begins with a methodological discussion of the criteria for evaluating an economic cost model. These criteria include: (1) adherence to a forward-looking costing methodology; (2) the ability to measure the cost of a narrowband network; (3) consistency with independent cost evidence; (4) potential for independent evaluation of model algorithms and input assumptions; and (5) flexibility to vary user input choices. The Bureau seeks comment on these design criteria, and other issues, including whether a proxy model should estimate the cost of a network capable of delivering broadband services as well as traditional narrowband services. In commenting on the above issues and any others that commenters regard as useful in evaluating the models, commenters should identify the criteria they believe are the most important and the basis for their position. Further, commenters should discuss whether and to what extent the models in the record, or any models submitted subsequently, satisfy these criteria.

The paper also contains a detailed analysis of the structure and input requirements of existing proxy models. With regard to model structure, the paper examines various issues including: (1) the use of existing local exchange carrier wire centers; (2) the geographic unit of analysis used by model proponents in designing their networks; (3) the specification of demand for business and special access lines; and (4) the specification of network elements included in a model and the services those elements are capable of providing. The paper also analyzes the engineering assumptions made by existing models submitted in one or more of the rulemakings listed above in determining levels of forward-looking investment, with particular attention directed to feeder and distribution routes, fill factors, investment in structures, and switching investment. Finally, the paper considers the those models' treatment of capital expenses, operating expenses, and joint and common costs. Commenters should use this analysis as a basis for their comments on existing proxy models. For instance, do the models include loop plant investment sufficient to meet demand? In addition, based on its analysis thus far, the Commission staff believes that varying any one of a number of input factors of the models, such as the cost of capital or the depreciation rate, may greatly affect the resulting prices or support payment amounts. The Bureau seeks comment on this view, and on which inputs are most critical to the soundness of the prices generated by the models. Should the Commission take steps to set specific inputs such as depreciation rates, capital costs, treatment of taxes, joint and common costs, and expenses, and, if so, how?

The staff's analysis attempts to identify the modeling assumptions and inputs that are most likely to have a significant impact on estimated costs. Where appropriate, commenters should indicate whether they agree or disagree with this analysis. In the case of model input choices, commenters can, if desired, recommend either specific input values or specific methodologies that could be used to select an appropriate input. In some cases, the staff analysis indicates areas in which alternative modeling approaches would be desirable, and commenters are asked to describe in detail such alternatives whenever possible. While commenters are invited to address any aspect of existing or future proxy models, particular attention should be paid to the following areas identified in the staff analysis: (1) the appropriate choice of fill factors and the treatment of structure costs; (2) methodologies for determining the appropriate forward-looking cost of capital and rate of depreciation; (3) alternative methodologies that models could use to estimate forward-looking operating expenses; and (4) sources of independent evidence that could be used to choose model inputs and verify model outputs.

The staff's analysis also considers several questions about the potential uses of models in pending proceedings on universal service, access reform and element pricing. For instance, could a single model, or combination of models, be used for multiple regulatory objectives, i.e., in determining cost-based access charges as part of a prescriptive approach to access reform and in setting both interconnection and unbundled element prices and universal service support levels? The Federal-State Universal Service Joint Board has already recommended that the models before it undergo refinement before they may be used to set universal service support levels. Similarly, the staff's analysis suggests that each of the models would need to be modified before it alone could be used to set cost-based access charges or to estimate network facilities' costs, and the Bureau seeks comment on this view. As an alternative to choosing a single model or set of models, could a hybrid model be

developed that would employ the most successful features and assumptions contained in individual models? The Bureau also seeks comment on the different design assumptions that commenters believe can or should be used in models used for different purposes. For instance, commenters that believe the modeling of the economic cost of providing network facilities or access costs can or should differ from the modeling of the economic costs of providing the services receiving universal service support should describe their reasons, including in part the differences in network investments required. Specifically, they should identify any costs included in unbundled elements that are directly attributable to unsupported services. More broadly, the Bureau seeks comment on whether the various inputs to the models, such as rate of return and depreciation, can or should differ for these different purposes.

The Bureau looks forward to receiving comments and working with all interested parties in developing reasonable approaches to using economic cost models as tools in resolving the various critical telecommunications policy issues described above. The comments should be filed on or before **February 3, 1997**, with reply comments due **February 14, 1997**. Commenters must file an original and four copies of their comments with the Office of the Secretary, Federal Communications Commission, Room 222, 1919 M Street, N.W., Washington, D.C. 20554. Comments should reference CPD Docket No. 97-2. Commenters should send one copy of their comments to the Commission's copy contractor, International Transcription Service, Room 140, 2100 M Street, N.W., Washington, D.C. 20037. Comments will be available for public inspection during regular business hours in the FCC Reference Center, Room 239, 1919 M Street, N.W., Washington, D.C. 20554.

Parties are also asked to submit comments on diskette. Such diskette submissions would be in addition to and not a substitute for the formal filing requirements addressed above. Parties submitting diskettes should submit them to Wanda M. Harris, Competitive Pricing Division, Common Carrier Bureau, 1919 M Street, N.W., Room 518, Washington, D.C. 20554. Such a submission should be on a 3.5 inch diskette in an IBM compatible format using WordPerfect 5.1 for Windows software in a "read only" mode. The diskette should be clearly labelled with the party's name, proceeding, and date of submission. The diskette should be accompanied by a cover letter.

For further information contact David Konuch, 202-418-0199, or Brad Wimmer, 202-418-1847.

PUBLIC NOTICE

Federal Communications Commission
1919 M St., N.W.
Washington, D.C. 20554

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DA 97-239
Released January 31, 1997

CCB/CPD No. 97-56

EXTENSION OF TIME GRANTED FOR PARTIES TO SUBMIT COMMENTS IN RESPONSE TO COMMISSION STAFF'S ANALYSIS OF COST PROXY MODELS

Comment Date: February 13, 1997
Reply Comment Date: February 20, 1997

On January 9, 1997, the Commission Staff released a Staff Analysis intended to stimulate discussion of criteria for the evaluation, and use, of forward-looking cost proxy models in determining universal service support payments, cost-based access charges, and interconnection and unbundled network element pricing.[1] Also on January 9, 1997, the Common Carrier Bureau ("Bureau") issued a Public Notice seeking comment on issues raised in the Staff Analysis, and setting deadlines of February 3, 1997 for initial comments, and February 14, 1997 for replies.[2] The Public Notice indicated that the record gathered in response to the Staff Analysis might at a future date be associated with the official record of certain pending rulemakings to which it may be relevant and used to support Commission determinations in those rulemakings. *See Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, *Access Charge Reform*, CC Docket No. 96-262, and *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98.

On January 24, 1996, Pacific Telesis Group, Sprint Corporation, and U S WEST, Inc., ("Petitioners"), filed a Motion for Extension of Time to File Comments in response to the *Public Notice*. For the reasons below, the deadlines for filing initial and reply comments are being extended until February 13 and February 20, 1997, respectively.

First, the Staff Analysis focused on models submitted previously to the Commission,

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[1] *The Use of Computer Models for Estimating Forward-Looking Costs, A Staff Analysis*, (rel. January 9, 1996)("Staff Analysis").

[2] Commission Staff Releases Analysis of Forward-Looking Economic Cost Proxy Models, Public Notice, DA 97-56 (rel. Jan. 9, 1997) and Erratum (rel. January 10, 1997)("*Public Notice*").

but the model sponsors have indicated that these models will be superseded by newer versions to be released by January 31, 1997, and by February 5, 1997. These new models are the Benchmark Cost Proxy Model ("BCPM"), to be submitted by Petitioners, and Hatfield 3, to be submitted by AT&T and MCI. Additionally, another model, Dr. Ben Johnson's Telecom Economic Cost Model, was filed in the universal service proceeding earlier this month. Inasmuch as the new models are intended to improve on the earlier versions, it would be more efficient for commenters and Commission staff to focus their efforts on evaluating the new models instead of the superseded versions. In addition, because the new models are scheduled to be released shortly before and after the current comment deadline, commenters will not be able to evaluate them at all in comments here without an extension.

The extension being granted is not the full period sought by Petitioners. We want to ensure that the responses filed to the Staff Analysis are available for possible use by the Commission in acting by May 8, 1997, on the recommendation of the Federal-State Universal Service Joint Board. Any longer extension could easily jeopardize such use of the record.

Among other things, parties should address in their comments whether, and to what extent, the new models: (1) meet the criteria set forth in the Staff Analysis; (2) improve on potential shortcomings of the prior versions of the models.

For further information contact David Konuch, 202-418-0199, or Brad Wimmer, 202-418-1847.

PUBLIC NOTICE

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DA 97-333
Released February 12, 1997

CCB/CPD No. 97-2

FURTHER EXTENSION OF TIME GRANTED FOR PARTIES TO SUBMIT COMMENTS IN RESPONSE TO COMMISSION STAFF'S ANALYSIS OF COST PROXY MODELS

Comment Date: February 18, 1997
Reply Comment Date: February 24, 1997

On January 9, 1997, the Commission Staff released a Staff Analysis intended to stimulate discussion of criteria for the evaluation, and use, of forward-looking cost proxy models in determining universal service support payments, cost-based access charges, and interconnection and unbundled network element pricing.[1] Also on January 9, 1997, the Common Carrier Bureau ("Bureau") issued a Public Notice seeking comment on issues raised in the Staff Analysis.[2] The Public Notice indicated that the record gathered in response to the Staff Analysis might at a future date be associated with the official record of certain pending rulemakings to which it may be relevant and used to support Commission determinations in those rulemakings. *See Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, *Access Charge Reform*, CC Docket No. 96-262, and *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996,* CC Docket No. 96-98.

On January 31, 1997, the Bureau extended the deadlines for filing comments in response to an extension petition filed by Pacific Telesis Group, Sprint Corporation, and U S WEST, Inc., to provide parties with more time to review new economic cost models that were about to be filed with the Commission. On February 10, 1997, GTE Service Corporation filed an Emergency Motion for Further Extension of Time on ground that the new models had been made publicly available later than originally expected, thus providing parties with less time to evaluate them. Because of difficulties in obtaining copies of the models experienced by some interested parties, the deadlines for filing initial and reply comments are being

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[1] *The Use of Computer Models for Estimating Forward-Looking Costs, A Staff Analysis*, (rel. January 9, 1996)("Staff Analysis").

[2] Commission Staff Releases Analysis of Forward-Looking Economic Cost Proxy Models, Public Notice, DA 97-56 (rel. Jan. 9, 1997) and Erratum (rel. January 10, 1997).

extended until February 18 and February 24, 1997, respectively.

The extension being granted is not the full period sought by GTE. We want to ensure that the responses filed to the Staff Analysis are available for possible use by the Commission in acting by May 8, 1997, on the recommendation of the Federal-State Universal Service Joint Board. Any longer extension could easily jeopardize such use of the record.

For further information contact David Konuch, 202-418-0199, or Brad Wimmer, 202-418-1847.

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February 13, 1997

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: Analysis of Cost Proxy Models
CPD Docket No. 97-2

Dear Mr. Caton:

Aliant Communications Co. ("Aliant"), by its attorneys, hereby submits its comments on the Staff Analysis of cost proxy models pursuant to the Commission's recent Public Notice.[1] These comments address specific sections of the Staff Analysis. In order to facilitate the Commission's consideration of these comments, they reference the particular section of the Staff Analysis to which they relate.

Paragraph 9: Use of Forward-looking Economic Cost as a Basis for Pricing

The use of forward-looking economic cost as the basis for pricing is appropriate when embedded cost reflects inefficiency. A working definition of forward looking economic costs should reflect the choices with which a real firm is confronted when that firm considers capital deployment. Those choices must accommodate both current demand in a particular market environment and prospective demand which is by its nature uncertain (especially with a competitive paradigm). Further, the investment decisions relative to provision of new network elements or new services must be made in the context of technology that has already been deployed. This context is necessary

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[1] Public Notice, DA 97-56 (released Jan. 9, 1997) and Erratum (released Jan. 10, 1997). The Commission extended the deadline for filing comments until February 13, 1997 in response to a petition for extension of time filed by several interested parties. Public Notice, DA 97-239 (released Jan. 31, 1997).

for an optimal economic decision to be made. This is not the same as using costs for a pricing decision that is embedded or historical in nature. It is, more precisely, conditioning a decision to deploy capital on events that have already occurred. The nominal result of this decision process is a mix of technology deployed at any point of time serving a demand whose growth is uncertain.

Paragraphs 12-14: Consistency with Independent Evidence

It has been Aliant's experience in the assessment of both Hatfield 2.2.2 and BCM2 that differences in key input parameter specifications have more to do with variances in output costs than do differences in how the models themselves function. In Aliant's view, therefore, it is most important to verify with independent evidence the input parameters and to examine the engineering principles on which the models function. Because these models produce hypothetical results it is difficult to compare those results with a real life situation. It may, however, be instructive to a decision maker to compare outputs of several different proxy models with normalized inputs or to compare with an econometric model as proposed by Strategic Policy Research ("A New Set of 'Top-Down' Incremental Cost Measures," Strategic Policy Research (SPR), November 17, 1996, Bethesda, Maryland). The SPR model was an attempt to capture the relationship between output or factor costs and certain causative drivers with the use of cross sectional and time series industry data from ARMIS reports. These relationships are valid into the future as long as there are no events that disrupt the causative dependence. Moreover, since all cost proxy models use a hypothetical network to estimate costs of UNE/USF, the actual forward looking costs calculated by engineering practice or the estimated cost of UNE/USF of incumbent LECs using an econometric cost model are likely to be different, as both actual cost and estimated cost from an econometric model are based on a mix of old and new technology. Therefore the validation of the model using results from econometric cost models could provide a plausible second best validation.

In addition Aliant is inclined to question the Staff Analysis assertion that forward looking proxy models necessarily produce results that are significantly lower than the results from embedded cost analysis using data from sources such as ARMIS. Aliant suggests that the outcome may be more of a result of how the proxy model inputs are populated. We do not believe that the latest technology necessarily dictates a lower input cost, nor does a service or element cost necessarily reduce over time. It should also be noted here that some proxy models such as Hatfield 2.2.2 utilizes historical relationships, determined from ARMIS, between capital investment and associated recurring labor expense to estimate forward looking labor expenses. A complete disassociation with past experience, in practical modeling, is essentially inescapable.

Paragraph 15: Potential for Independent Evaluation

The use of proxy models for determining network investments has been met with significant resistance by most incumbent local exchange carriers ("LECs"). A method of independent validation would increase confidence in the proxy model approach. It is suggested that an econometric model

could be developed which would confirm or deny the validity of proxy model results. An econometric model can be designed to project the future. The use of publicly available data would remove concern about proprietary information.

Paragraph 16: Flexibility

Aliant agrees with the Staff Analysis that "the more model inputs can vary, the more useful a model will be." The incumbent LECs that provide unbundled network elements, wholesale services for resale, access services to interexchange carriers and universal service are real companies of widely varying scale and scope. Any proxy that attempts to model the costs of these elements and services must have sufficient variability of inputs to allow for legitimate differences between incumbent LECs. Aliant believes that differences in input prices net of vendor discounts, costs of capital, fill factors, sharing percentages, economic lives, etc. should be accommodated to prevent smaller incumbent LEC providers from experiencing undue economic burden of being held to standards higher than companies of their size can attain.

Paragraphs 18-21: Existing Wire Center Approach

Aliant believes that the current assumption of the models placing wire centers at existing incumbent LEC wire centers is a good balance between forward-looking engineering theory and the actual practice of having to deploy a network over time in anticipation of demand, population and business growth and technological development. Removing this constraint would allow the models to be used to impose a regulatory economic burden on incumbent LECs that other businesses, including new competitive LECs, do not have imposed on them. The location of wire centers will change over time, new wire centers will be added, existing wire centers removed and/or written off, but this will happen due to economic market demands and with economic market consequences. These changes and consequences should not be dictated by the use of any cost model now or in the future.

Paragraphs 22-24: Geographic Unit of Analysis

Aliant believes that a finer geographic unit of analysis than Census Block Groups ("CBG") is required for rural areas. Rural CBGs cover larger areas. A rural CBG often contains a town or population concentration that would cause it to be grouped in a higher population density and so understates the number of low density high cost lines. An assumed even distribution of population in these zones could also cause costs to be understated or overstated. The better a model takes into account the realities of where the customers are, where roads or rights of way are, and the terrain and other characteristics that impact the cost of placing facilities, the more accurately it would estimate the actual costs of providing elements or services.

Aliant also believes that the more a model will produce costs specific to a particular zone, CBG, grid, or route in the case of transport, the more useful it will be in accommodating future de-averaging to allow an incumbent LEC to offer competitive prices in response to competitors' targeting of customers whose averaged rates exceed their specific cost.

Paragraphs 25-28: Specification of Demand

As was pointed out in the Staff assessment, current versions of cost proxy models utilize current demand from Census data to construct hypothetical networks. The result of that assumption should result in a match with necessary investment and offered demand. The important effect that needs to be accommodated in model inputs, however, is the effect of capital deployment decisions under demand growth uncertainty. The Hatfield and cost proxy models replace the household count in each CBG with estimated total access lines including business, public, special access, and first and second residential lines. This method of estimating demand is likely to create upward biases in the demand for telephone service as in reality demand grows over time and is not equal to the total number of households in a CBG. Moreover, incumbent LECs collect data on number of lines per exchange but not per CBG. It is therefore difficult to check the magnitude of the measurement error in the estimated number of lines in CBG. The overestimation of demand will also result in higher fill factor implying underestimation of loop cost. This can be accommodated by the use of reasonable fill factors that use real data on average fills over the life of an investment. To use final fill factors is not representative of actual experience over time. Finally, the Staff Analysis suggestion on the use of prospective demand may be less plausible in the context of the competitive paradigm.

Paragraphs 31-32: B. Modeling of Network Investments

Aliant believes that is critical that any proxy model develop the cost of a network actually capable of delivering telecommunications services. Specifics about the network developed by the model should be readily available for verification and models should have the flexibility of inputs to accommodate any required corrections. Aliant does not believe that any of the models presented to date allow for this very well. The problem of validating network investments could be eased by making available intermediate results from various stages of the network construction process. As an example, the length of feeder and distribution cables for a given geographic area could then be used to compare to the real world geography.

Paragraphs 33-40: Loop Plant - Feeder and Distribution

Aliant agrees with Commission Staff on the importance of the loop plant developed by the model being sufficient to satisfy demand. (para 33) There is the reality of decisions faced in building a network over time. It would be irrational for incumbents to constantly update their facilities to incorporate the continuous technological progress. When a new technology is introduced, the relevant economic costs are based on a mixture of the existing and new technologies. Aliant feels

the cost model must be flexible to adapt to the changing marketplace. Also, an incumbent LEC's investments have, at times, been mandated because of obligations as carriers of last resort. Therefore, the cost model outputs may suggest some inefficiencies of an incumbent LEC's present operations.

Aliant believes that there should be a methodology for assuring that the models accurately estimate the cost of loop plant. These cost validations should include all areas and should not be limited to rural. In order to implement some procedure to accomplish this intent, the model sponsors need to open the models to allow viewing the network infrastructure that the model is constructing. At a minimum this should be a table of actual component units. The preferable method would exhibit a cable layout showing the feeder/distribution relationships within each CGB and a listing of all the network elements. This network can then be evaluated to determine if it will construct the infrastructure necessary to provide the service and allow independent computational analysis for determining the accuracy of the estimate of loop cost. Validation of costs should be an engineering assessment to determine an efficient, actual network.

Paragraphs 41-43: Loop Plant - Fill Factors

All models construct a static network based on current demand. There are no variable time frames utilized within any of the models to construct this network. An incumbent or actual entrant may be efficient in a dynamic sense in constructing real networks, but not efficient in the model's idealized static design.

In a dynamic network design, unused capacity is built into the network to account for future growth in demand over the service life of the plant, thus creating a lower fill factor. An efficient network designer would consider the cost of initially placing all the necessary cables to serve a designated area versus the cost of multiple placements over time and the carrying charges associated with having a period of excess capacity until demand grows into the cable. A new entrant, behaving in an efficient manner, would also not instantaneously construct a network to serve all the incumbent's customers, but would consider making these investments over time based on the new entrant's projected service requirements. The actual fill on these cables will increase with the rate of service growth and will vary by population density and the mix of residential and business requirements.

Traditional cable design allows for the unpredictable service growth patterns that materialize in any new or expanding development by placing the unused or spare cable facilities in multiple locations within the same region. This practice, by removing some of the uncertainties of the cable design, allows for higher fill factors. The models take a simplistic design approach of tapering a cable at each point on a distribution or feeder route. Because this essentially dedicates the spare facilities to much smaller areas, much lower fill factors than the default settings must be utilized in

the models in order to efficiently utilize the cable plant it constructs. This is the basis for lower default fill factors in the low density distribution systems.

In a dynamic cable network design plan, feeder cable fills are higher than distribution fills in high density urban areas because of the shorter planning period associated with reinforcement of feeder cable and also the feeder structure support systems are typically in place to facilitate these reinforcements. Rural feeder and distribution system fill factors along with urban distribution fill factors are required to be lower because of the more difficult nature of a future cable reinforcements in these areas.

Aliant proposes that the fill factor input assumptions should rely on established network engineering standards of the incumbent because of the requirements that are unique to each service area. Aliant also proposes that these fill factors resemble the dynamic design of a lower average fill used over the projected service life of the plant rather than the higher static fill of cables at the end of their projected service life.

Paragraphs 44-47: Loop Plant - Cable and Structures

The actual mix of underground, aerial and buried cable will vary by the design principles of each incumbent LEC and within each incumbent LEC it will vary by population density and other factors such as zoning restrictions. Aliant believes that it is imperative that the models have the flexibility to reflect these parameters by allowing the user the capability to input this necessary "mix" information to help reflect a more accurate network cost. At a minimum this would include the mix of structure type to be a variable that is dependent on density levels.

The same analogy holds true for infrastructure sharing. In a predominately rural, low density service area there will be a minimal infrastructure sharing because of the distinct design parameters and cost associated with facility placement by each utility. This can also be true for underground sharing in high density areas. Aliant's position on infrastructure sharing is that the inputs must also be flexible and at least be a variable that is dependent on the density levels.

Paragraphs 48-50: Switching Investment

The major difficulty in determining switching costs appears to be in switch prices and associated discounts. It is suggested that the FCC and exchange carriers work together to encourage switch vendors to publish prices for switches which meet a given set of general specifications. The specifications would include switch size, call capacity, quantity discount, etc. A model which can disassemble an element which provides multiple services and assign costs to each service based on actual utilization of that investment should be favored. Utilizing Bellcore's switching cost information system (SCIS) or similar method is such an approach.

The FCC Staff is correct in pointing out the expected growth in demand should be accounted for in making investment decisions. Other forward looking technology changes should also be account for like: 1) ISDN, 2) AIN (required to implement the FCC mandated local number portability), and 3) integrated ADSL line cards. These features, while not immediately necessary would be allowed for at some incremental cost in any purchase decision when designing an efficient network.

Paragraph 51: Other Investments

The FCC Staff is correct in stating in paragraph 51 that modeling the specific costs for interoffice elements is superior. This principle should be applied as much as possible to all hardware and software which is used to provide telecommunications services. In particular the specific costs of switching and transmission equipment with appropriate company specific discounts should be utilized whenever possible. Any model adopted by the FCC should allow the input of published vendor pricing for each identifiable element with the ability to specify a particular company's discount should be utilized.

Paragraphs 53-63: Capital Expenses

Aliant agrees with the Commission Staff "that, when estimating the forward-looking cost of capital, models should rely on market-determined costs for debt and equity as well as debt-equity ratios chosen by firms." (paragraph 57) These costs and ratios will vary between firms and the models should allow for these differences. Aliant also believes that the forward-looking market determined cost of equity should include an adjustment for the increased risk and uncertainty of newly competitive markets.

Aliant also agrees with Commission Staff "that depreciation schedules specified in a proxy model should be based on forward-looking costing principles and should reflect projected economic lives..." (paragraph 60). ARMIS data reflects depreciation rates prescribed in regulatory proceedings, financial reports reflect depreciation rates judged reasonable by independent auditors and independent firms develop economic lives. In a competitive environment economic lives are likely to be shorter than in a regulated monopoly due to the competitive pressure to employ increasingly economically efficient new technologies more rapidly. The economic lives reflected in current and historical depreciation rates should be adjusted accordingly.

Paragraphs 64-69: Operating Expenses

Aliant believes that any mechanism employed by a proxy model to include operating expenses must allow for the legitimate differences of ILECs of varying size and scope. Aliant believes that a cross-sectional econometric analysis may prove useful in developing the appropriate relationships between ILECs of different size and scope.

The Staff Analysis endorses the cautious interpretation of estimates of forward-looking expenses using an econometric approach based on a relationship among historical variables (para 69). The relationship of expenses to investments in Hatfield 2.2.2 derived from ARMIS data is historical as well. The relationship between costs and their causative drivers is the important issue. These relationships can be appropriately applied in the future unless there is a significant technological aberration that impacts the relationship.

Paragraphs 70-73: Treatment of Joint & Common Costs

Aliant believes that incumbent LECs with smaller scale and scope will have legitimate proportionally higher forward looking joint and common costs and that proxy models should allow for this difference. The determination of what forward looking joint and common costs are reasonable may need to be determined during the particular application of a proxy model. Aliant does not believe that a uniform loading of forward looking joint and common costs across all elements and services promotes economic efficiency, but so far, the Commission has expressly prohibited the use of Ramsey pricing which would promote economic efficiency. At the same time, Aliant believes that parity between substitutable elements and services must be achieved to prevent the opportunity for uneconomic arbitrage. Substitutable offerings, be they retail services, wholesale services or unbundled network elements should bear a common share of joint and common costs as well as any Universal Service Funding requirements.

Aliant appreciates the opportunity to present its views on the Staff Analysis and asks that the Commission accept the Comments contained herein.

Respectfully submitted,

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Albert Shuldiner
Counsel for Aliant Communications Co.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	DA 97-56
The Use of Computer Models For	)	
Estimating Forward-Looking Economic	)	
Costs	)	

Comments of Ameritech

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TABLE OF CONTENTS

Before the
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Washington, D.C. 20554

In the Matter of	)	
	)	DA 97-56
The Use of Computer Models For Estimating Forward-Looking Economic Costs	)	

Comments of Ameritech

I. Introduction & Summary.

Ameritech files its Comments responding to the Public Notice[1] and the related Staff Analysis[2] regarding cost proxy models. In its Comments, Ameritech will show that, as the Commission Staff establishes in the Staff Analysis, the current proxy models are flawed, untested, and produce conflicting and unreliable results. Accordingly, the Commission should not utilize them for any purpose before they are fully validated.

Ameritech will also demonstrate that no cost proxy should be used to set prices, particularly in a marketplace that is or may become competitive. No matter how sophisticated or refined a cost proxy model becomes, it still

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[1] "Commission Staff Releases Analysis of Forward-Looking Economic Cost Proxy Models," FCC, DA 97-56, January 9, 1997 ("Public Notice").

[2] Atkinson, Jay, Chris Barnekov, David Konuch, William Sharkey, and Brad Wimmer, "The Use of Computer Models for Estimating Forward-Looking Economic Costs," FCC Staff, January 9, 1997 ("Staff Analysis").